

AMENDMENTS TO THE CLAIMS:

The following listing of claims supersedes all prior versions and listings of claims in this application:

1. (Currently Amended) A substrate-based assembly for carrying optical and/or electrical components, the ~~substrate-based~~ assembly comprising:
at least one optical component assembled with at least one different component for use together in providing a function in use of the assembly;
a packaging layer for said assembled components,
wherein the packaging layer comprises a glass material having both organic and inorganic components and is provided with at least one recess for use in assembling said components.
2. (Withdrawn) A substrate-based assembly according to Claim 1 wherein the glass material includes an organic component which polymerises by cross-linking.
3. (Withdrawn) A substrate-based assembly according to claim 1 wherein the glass material includes an organic component which polymerises under thermal or photo treatment.
4. (Withdrawn) A substrate-based assembly according to claim 1 wherein the glass material includes at least one of an epoxy component, aluminium oxide and silicon oxide.
5. (Withdrawn) A substrate-based assembly according to claim 1 wherein the glass material comprises an inorganic matrix provided at least in part by a metal

alkoxide or salt, the metal alkoxide or salt each being hydrolysed in provision of the inorganic matrix.

6. (Withdrawn) A substrate-based assembly according to claim 5 wherein the metal alkoxide or salt is based on groups 3A, 3B, 4B and/or 5B of the Periodic Table.

7. (Withdrawn) A substrate-based assembly according to claim 1 wherein the glass material includes at least one hydrocarbon compound from the group comprising acrylates, epoxides, alkyls, alkenes, and aromatic groups.

8. (Withdrawn) A substrate-based assembly according to claim 1 wherein the coefficient of thermal expansion of the packaging layer approaches that of the substrate material.

9. (Withdrawn) A substrate-based assembly according to claim 1 which further comprises electrical interconnect material for providing electrical connection to at least one component packaged by the packaging layer.

10. (Withdrawn) A substrate-based assembly according to Claim 9 wherein the coefficient of thermal expansion of the packaging layer approaches that of the electrical interconnect material.

11. (Withdrawn) A substrate-based assembly according to Claim 8 wherein the coefficient of thermal expansion of the packaging layer differs from the coefficient of thermal expansion of the electrical interconnect material and/or the substrate material by not more than 15 parts per million.

12. (Withdrawn) A substrate-based assembly according to claim 9 which further comprises at least one contact pad for a wire bond to the at least one component, the electrical interconnect material being present in said contact pad or wire bond.

13. (Withdrawn) A substrate-based assembly according to claim 9 which further comprises at least one mounting pad for mounting the at least one component, the electrical interconnect material being present in said mounting pad.

14. (Currently Amended) A substrate-based assembly according to claim 1, ~~comprising~~ wherein said at least one optical component comprises a bump bonded optical component.

15. (Withdrawn) A substrate-based assembly according to claim 1 wherein the material of the packaging layer is lithographically patterned.

16. (Withdrawn) A substrate-based assembly according to Claim 15 wherein the material of the packaging layer comprises at least one organic material which photopolymerizes, the at least one organic material being selected from the group comprising acrylates, epoxides, alkyls, alkenes, and aromatic groups.

17. (Withdrawn) A substrate-based assembly according to claim 1 wherein the packaging material has a processing temperature of not more than 450°C.

18. (Withdrawn) A substrate-based assembly according to claim 1 wherein the packaging material has a processing temperature of not more than 200°C.

19. (Withdrawn) A substrate-based assembly according to claim 1 wherein the packaging material has a processing temperature of not more than 150°C.

20. (Withdrawn) A substrate-based assembly according to Claim 17 wherein the packaging material is fabricated from a material comprising a polymerisation initiator.

21. (Currently Amended) A substrate-based assembly according to claim 1 ~~which comprises wherein said~~ at least one optical different component ~~and at least one comprises an~~ electronic device.

22. (Currently Amended) A substrate-based assembly according to Claim 21 wherein the ~~at least one~~ electronic device comprises an integrated circuit.

23. (Currently Amended) A substrate-based assembly according to claim 1 ~~which comprises wherein said~~ at least one active optical component ~~and at least one comprises a~~ passive optical component.

24. (Withdrawn) A substrate-based assembly according to claim 1 having a substrate comprising at least one material from the group comprising silicon, glass, composite materials, ceramics and printed circuit board.

25. (Withdrawn) A substrate-based assembly according to claim 1 wherein the packaging layer is a passivation layer.

26. (Withdrawn) A substrate-based assembly according to claim 1 wherein the packaging layer is a planarisation layer.

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27. (Withdrawn) A substrate-based assembly according to Claim 26 wherein the planarisation layer provides an optical function in use of the assembly.

28. (Withdrawn) A substrate-based assembly according to Claim 27 wherein the optical function comprises waveguiding.

29. (Currently Amended) A substrate-based assembly according to Claim ~~[[25]]~~ 1 wherein ~~the planarisation layer is provided with~~ said at least one recess comprises an aperture to give access to an electrical interconnect structure.

30. (Currently Amended) A substrate-based assembly according to Claim ~~[[25]]~~ 26 wherein one or more components or devices is mounted at least partially on the ~~planarisation~~ planarization layer and the ~~planarisation~~ planarization layer provides support to said one or more components or devices.

31. (Withdrawn) A substrate-based assembly according to claim 1 comprising at least two packaging layers, each of said at least two packaging layers comprising a glass material having both organic and inorganic components.

32. (Withdrawn) A substrate-based assembly according to Claim 31 wherein the refractive index of a first of the at least two packaging layers is different from the refractive index of a second of the at least two packaging layers.

33. (Withdrawn) A substrate-based assembly according to claim 1 wherein the packaging layer, or at least one packaging layer, transmits optical radiation in use of the assembly.

34. (Withdrawn) A substrate-based assembly according to claim 1 wherein the packaging layer, or at least one packaging layer, provides a waveguiding function in use of the assembly.

35. (Withdrawn) A substrate-based assembly according to claim 1 wherein the packaging layer, or at least one packaging layer, provides an alignment feature for use in aligning an optical component in the assembly.

36. (Withdrawn) A substrate-based assembly according to claim 1 wherein the packaging layer, or at least one packaging layer, provides refractive index matching in use of the assembly.

37. (Withdrawn) A substrate-based assembly according to claim 1 wherein the packaging layer, or at least one packaging layer, provides bonding between optical components in the assembly.

38. (Currently Amended) A substrate-based assembly according to claim 1 ~~comprising~~ wherein said at least one active optical component comprises an active optical component.

39. (Original) A substrate-based assembly according to Claim 38 wherein the active optical component comprises a laser or a tunable optical source.

40. (Currently Amended) A substrate-based assembly according to claim 38 wherein ~~[[the]]~~ said at least one recess comprises an aperture to give access to an electrical interconnect structure and wherein the active optical component is bump-bonded in the assembly to provide the electrical interconnect structure.

41. (Currently Amended) A substrate-based assembly according to claim 38 wherein said at least one recess comprises an aperture to give access to an electrical interconnect structure and wherein ~~the at least one~~ active optical component is flip-chip mounted in the assembly to provide the electrical interconnect structure.

42. (Currently Amended) A substrate-based assembly according to Claim 41, wherein the active optical component comprises a laser or a tunable optical source, the assembly further comprising an optical modulator, external to the laser or tunable optical source.

43. (Withdrawn) A substrate-based assembly according to claim 1 wherein the substrate-based assembly comprises a thick substrate-based assembly.

44. (Withdrawn) A substrate-based assembly according to claim 1 wherein the substrate-based assembly has a thickness in the range from 1 micron to 1 millimetre.

45. (Previously Presented) Opto-electronic equipment comprising a substrate-based assembly according to claim 1.

46. (Withdrawn) A method of making a substrate-based assembly as described in claim 1 by packaging a substrate-based assembly according to a method comprising providing a packaging layer comprising a glass material having both organic and inorganic components.

47. (Withdrawn) The method according to Claim 46, wherein the method further comprises the step of lithographic processing of the packaging layer.

48. (Currently Amended) A method of fabricating a substrate-based assembly as described in claim 1, ~~the assembly comprising at least one optical component mounted in relation to a substrate,~~ the method comprising:

lithographic processing of each fabricated layer of the substrate-based assembly, at least one fabricated layer comprising a glass material having both organic and inorganic components.

49. (Currently Amended) A method of fabricating a substrate-based assembly, the assembly being according to Claim 1, using bump bonding material to bump bond the at least one optical component to a mounting pad, wherein the method comprises:

- a) maintaining the temperature of the bump bonding material above a softening temperature for the material and micro-manipulating the component in relation to the mounting pad; and
- b) lowering the temperature of the bump bonding material to below said softening temperature so as to achieve bump bonding.

50. (Currently Amended) A method of fabricating a substrate-based assembly as described in claim 1, the method comprising:

using gray scale lithography to fabricate a groove of tapered cross section in a packaging layer for mounting a fibre for optical coupling with ~~[[an]]~~ the at least one optical component, said packaging layer comprising a glass material having both organic and inorganic components.

51. (Withdrawn) A method of fabricating a substrate-based assembly according to Claim 1 which comprises depth adjustment in a packaging layer.

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52. (Withdrawn) A method of fabricating a substrate-based assembly according to Claim 51 wherein said depth adjustment comprises the use of a lithography mask having non-uniform optical density.

53. (Withdrawn) A method of fabricating a substrate-based assembly as described in claim 1, the method comprising:

- applying an electrical interconnect structure to a surface,
- applying a planarization layer over the electrical interconnect structure; and
- creating one or more apertures in the planarization layer to give access to the electrical interconnect structure,

- said planarization layer comprising a glass material having both organic and inorganic components.